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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 23

Application Number: 09/390,255
Filing Date: September 03, 1999
Appellant(s): ACHARYA ET AL.

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Technology Center 2600

Fred G. Pruner, Jr., Reg. No. 40,779
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed February 2, 2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. It appears that the issue is simply whether or not claims 16-33 are unpatentable over Kolarov et al., 6,144,173, in view of Zandi et al., 6,222,941. Appellant makes allegations in points A-C that "the Examiner has failed to establish a *prima facie* case of obviousness for independent" claims 16, 23, and 29 respectively. These allegations are not issues, and should be saved for the argument section. Independent claims 16, 23, and 29 are basically the same, except being in a different statutory class, namely, a method for claim 16, a storage medium storing instructions for claim 23, and a computer system for claim 29.

(7) Grouping of Claims

The appellant's statement in the brief that certain claims do not stand or fall together is not agreed with because the only difference between Appellant's groupings A-C in section IV. ISSUES is the statutory class, i.e. a method for claim 16, storing instructions in a storage medium readable by a processor-based system for claim 23, and a computer system for claim 29. The statutory classes of these three claims, 16, 23, and 29, clearly have no effect on the central idea of Appellant's invention. The crux of these three claims is essentially the same. Thus, claims 16-33 should stand or fall together.

(8) Claims Appealed

A substantially correct copy of appealed claims appears on page i-v of the Appendix to the appellant's brief. The minor errors are as follows:

Claim 24, line 1, should recite "order is" vs. "order-is".

(9) Prior Art of Record

6,144,773	KOLAROV ET AL.	11-2000
6,222,941	ZANDI ET AL.	4-2001

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the

> subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 16-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolarov et al., 6,144,773, in view of Zandi et al., 6,222,941.

As a general note to the claims, especially independent claims 16, 23, and 29, exemplary claim 29 recites (16 and 23 recite equivalent language) "for each said bit order, code the associated bits to indicate zerotree roots". One should not be confused into thinking that each bit order of the wavelet coefficients must or will indicate zerotree roots, because in zerotree coding, the zerotree root is only one type of attribute in zerotree coding. Thus, the claims should not be unnecessarily narrowly interpreted, for without a broad interpretation of these claims, there would clearly be enablement issues. See the Applicant's specification with respect to the different possible types of zerotree attributes in at least the first full paragraphs on pages 5-6.

For claim 29, a computer system comprising a processor and a memory storing a program to cause the processor perform wavelet compression is provided by Kolarov in at least the abstract for wavelet compression, and c. 7, line 34 – c. 8, line 27 for a processor and memory.

The wavelet compression of Kolarov provides for the claim as follows:

Kolarov provides wavelet coefficients that indicate an image in the third and fourth full paragraphs in c. 12, where Kolarov explicitly recites processing an image, and block 309 of Fig. 3a explicitly recites bitplanes, which is are what make up an image,

and wavelet coefficients thereof is explicitly recited by Kolarov in at least block 320 in Fig. 3a. The bits of each wavelet coefficient being associated with a different bit order so that each bit order is associated with one of the bits of each wavelet coefficient is provided by Kolarov in at least c. 19, line 19 – c. 20, line 13, where it is clear that the bits of each wavelet coefficient are uniquely ordered by at least bitplane significance and each bitplane order is associated with one wavelet coefficient bit, and additionally by the significance function of Kolarov. See also c. 5, lines 19-41, of Kolarov for wavelet coefficients bits associated with a specific order, and also Zandi in at least the last full paragraph in c. 6 and in most of c. 16, where bits are and can be uniquely ordered not only by bitplanes.

For each said bit order, code the associated bits to indicate zerotree roots that are associated with the bit order is not explicitly recited by Kolarov, but Kolarov clearly does provide for coding associated bits for each bit order in at least Figs. 4a-4c and c. 20, line 14 – c. 21, line 33, where each bit, ordered by at least significance, is coded using an algorithm "analogous to Algorithm II of Said-Pearlman". The process of determining significance is a central part in determining zerotree attributes in any zerotree coding method. It is noted that this reference is incorporated by reference into Kolarov in the last full paragraph in c. 8, which is an extended technique of the zerotree algorithm of Shapiro. Zandi also cites, similar to Kolarov, and uses a modification of the zerotree method of Shapiro in at least the fourth and fifth full paragraphs in c. 23. See at least the second and third full paragraphs in c. 23 of Zandi for the similarities of the zerotree attributes. Not only is Zandi considerably analogous to the Applicant's

invention and Kolarov, Zandi further, like the Applicant and Kolarov, classifies zerotree attributes on a bit basis as considerably detailed in the previous Office actions, and again, for example, in at least the third full paragraph in c. 24, the paragraph bridging cols. 24-25, and the last full paragraph in c. 25, where Zandi clearly determines zerotree roots on a bit basis contrary to the Applicant's arguments. It would've been obvious to one having ordinary skill in the art at the time the invention was made to indicate zerotree roots, as taught by Zandi, with the zerotree compression of Kolarov, because it should be clear based on the above analysis that both Zandi and Kolarov rely on the basic zerotree coding algorithm, which determines, inter alia, zerotree roots, and further because Zandi offers many advantages, such as "efficiently" coding the significance data with the zerotree method (c. 23, second full paragraph), "an ordering which preserves the tree structure is fixed and used consistently" (c. 24, second full paragraph), coding based on bit significance, and further provides for a termination test for determining whether a desired compression ratio is reached in the first full paragraph in c. 25.

For claim 30, wherein each bit order is associated with only one of the bits of each wavelet coefficient is clearly provided from the rejection above, where the orders of at least bitplanes are distinct.

For claim 31, determining which of the bits indicate zeros is provided by both Kolarov and Zandi where cited above, and classifying each zero as either an isolated

zero or a zerotree root is considered implicitly provided by Kolarov; and explicitly by Zandi where cited above.

For claim 32, wherein some of the wavelet coefficients are descendants of some of the other wavelet coefficients is already provided by the zerotree concept and explicitly by Kolarov in at least the last full paragraph in c. 19, and also by Zandi where cited above, and wherein the processor determines which of the bits are zeros by traversing a descendant tree from a bit associated with one of the some of the wavelet coefficients to bit associated with the other wavelet coefficients to locate the zerotree root is indicated by Kolarov above, where each bit is tested for significance, which is basic concept in zerotree coding to determine zerotree attributes. See also the rejection above with respect to Zandi, who explicitly provides for the zerotree roots, and traverses the tree with respect to bits, and see Zandi also in at least the paragraph bridging cols. 22-23, the second full paragraph in c. 24 and the last two full paragraphs in c. 24, where it should be clear that the tree is traversed, since the children are determined for significance only after the parents (i.e. tree traversal) as is part of conventional zerotree coding.

For claim 33, providing the wavelet coefficients by producing different levels of the code, each level being associated with a different reference of the image is basically provided by the concept of the wavelet transform simply illustrated by Kolarov in at least the third full paragraph in c. 9. It is noted that Kolarov uses a modified tree of

coefficients in block 362 in Fig. 3b, but it is still a tree, and therefore hierarchical in resolution, as indicated in at least the last two full paragraphs in c. 17. Zandi was used above for the explicit recitation of zerotree roots, and also produces, inter alia, zerotree root attributes as part of the wavelet codes, and it is clear that these codes cover different resolutions, since the wavelet coefficient tree is coded using the parent root down in resolution to the children/descendents where cited above.

For claim 16, see the rejection of at least claim 29.

For claims 17 and 23-24, see the rejection of at least claim 30.

For claims 18 and 25, see the rejection of at least claim 31.

For claims 19 and 26, see the rejection of at least claim 32.

For claims 20 and 27, see the rejection of at least claim 33.

For claims 21 and 28, wherein the levels that are associated with lower resolution are associated with higher orders is understood provided by the hierarchical concept indicated in at least the third full paragraph in c. 9 of Kolarov, because the coarse, i.e. lower resolution, is associated at the highest level or order in the tree, while the finer resolutions are associated with the lower levels in the tree. See also Zandi in at least the last full paragraph in c. 14 for the same well known concept.

For claim 22, providing wavelet coefficients comprises providing intensity level coefficients that indicate pixel intensities of the image is clearly provided by Kolarov in at

least the first and fourth through the last full paragraphs in c. 12, which indicate different an image as an example, where color/gray scale for example provide for intensity levels of pixels. Transforming the intensity level coefficients into wavelet subbands is provided by Kolarov in at least the second through the fourth full paragraphs in c. 13, for the wavelet transform, and subbands are explicitly recited for example in the first and second full paragraphs in c. 16 with reference to HH or HL for example, which are specific subbands. See also at least c. 14, lines 15-64 of Zandi, where subbands are explicitly recited.

(11) Response to Argument

The Appellant argues on pages 12-15 in section A of the Appeal Brief the following:

1. That Zandi is directed to wavelet multibit coefficient based coding as opposed to the claimed bit based coding of the wavelet coefficients, so that Zandi does not provide for coding the bits of each order to indicate zerotree roots.

2. That Kolarov also does not provide for bit based coding of the wavelet coefficients, and like Zandi, also encodes "entire multiple bit wavelet coefficients for zerotree roots, not for each bit order.

3. That "[t]esting a wavelet coefficient for bit significance is not equivalent to encoding the bit orders of wavelet coefficients".

The Examiner respectfully disagrees:

1. The Appellant's crucial assertion that Zandi provides for coefficient based zerotree coding and not bitwise zerotree coding is not only false, but such a distinction

between the two is not claimed. First, "the bits of each wavelet coefficient being associated with a different bit order so that each bit order is associated with one of the bits of each wavelet coefficient" is clearly provided by Zandi in c. 6, lines 40-43 and lines 50-58, which teaches that the coefficients are ordered based on **bit** significance, and which explicitly recites ordering the bitplanes for coding. It should be understood that a specific bitplane consists of the "bit order" of each coefficient. Second, these **bits** are explicitly coded to indicate, inter alia, zerotree roots associated with the order by Zandi in c. 23, lines 19-23, and that **bits** are coded, see Zandi in c. 23, lines 36-40, and c. 24, lines 26-31. It is here (where cited above) that Zandi explicitly recites coding in a bit-wise fashion, and not some global multibit fashion as argued by Appellant. Furthermore, "coding the associated bits to indicate zerotree roots that are associated with the bit order" does not preclude a multiple bit zerotree wavelet coding.

2. Like Zandi, Kolarov also explicitly provides for coding wavelet coefficients consisting of individual bits, such bits corresponding to bit orders, where each bit of each wavelet coefficient is processed, and not just the wavelet coefficient as a whole – Kolarov, c. 5, lines 19-41, and in general with respect to Figs. 4a-4c of Kolarov and particularly in c. 20, line 14, to c. 21, line 33, where it is clear that each bit is tested for significance in the coding process.

3. Contrary to Appellant's assertion that testing a wavelet coefficient for bit significance is not equivalent to coding bit orders of wavelet coefficients, testing the wavelet coefficient bits is clearly a central part of the coding process. See **both** Zandi and Kolarov where cited above in arguments 1-2 above. The significance of the

individual bits is paramount to determine whether "each bit order" should be coded as, inter alia, a zerotree root. In the case the bit is significant, "each bit order" would not be coded as a zerotree root, but perhaps as positive significant, for example.

The Appellant argues on pages 15-16 in section B of the Appeal Brief the following:

4. Basically the Appellant argues the same arguments above, and further recites that the "Examiner points to no text that would imply the missing claim limitations". Section B is directed to the storage medium of claim 23 that is readable by a processor-based system.

The Examiner respectfully disagrees:

4. The Examiner has cited numerous passages with both references as argued above and in the rejections above. Thus, a prima facie case has clearly been established. As for a processor based system that has a computer storage readable medium, c. 7, line 34 – c. 8, line 27, of Kolarov is explicitly pointed out in the Office actions, which clearly anticipates a computer storage readable medium for a processor.

The Appellant argues on pages 16-17 in section C of the Appeal Brief the following:

5. Basically the Appellant argues the same arguments above, and further argues that the "Examiner admits that Kolarov does not explicitly teach the missing claim limitations and fails to show where Zandi teaches of suggests the missing claim

limitations". The only thing that the Examiner admits with respect to Kolarov missing is the explicit teaching using the well known zerotree root symbol being associated with the coding of the bits. As argued in the rejections, because Kolarov also teaches a very similar system for coding the wavelet bits, where both references teach determining bit significance in the coding process, it is considered obvious that Kolarov can clearly use at least the zerotree root symbol as well, as clearly taught by Zandi.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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